Attorney Docket No.: 30000.0002
Customer No.: 57362

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Ernst-Werner WAGNER	Group Art Unit: 3752
Application No.: 10/584,905	Examiner: Steven Michael CERNOCH
Filed: May 16, 2007	Atty. Dkt. No.: 30000.0002
Confirmation No.: 5041	Customer No.: 57362

For: INERTIZATION METHOD FOR REDUCING THE RISK OF FIRE

DECLARATION UNDER 37 C.F.R. 1.132

I, Ernst-Werner Wagner, of 29308 Winsen, Germany, do declare and state that:

I received a B.S. degree in Electrical Engineering from the University of Applied Sciences in Hanover in 1976.

I have been engaged in the research and development of various fire extinguishing systems and, in particular, systems for reducing the risk of fires and for extinguishing fires in enclosed spaces.

I have reviewed the present Application No. 10/584,905, filed June 28, 2006, and based on PCT/EP2004/13285, including the Amendment Under 37 C.F.R. 1.111 filed November 5, 2009. I have also examined the Final Office Action of the Examiner dated February 1, 2010, and in particular US Patent Application Publication No. 2003/0226669 A1 (Wagner) of which I am the sole Inventor of the invention described

therein. As a result of my detailed review, I would like to make the following observations.

My invention as described in US 2003/0226669 A1 relates to an inertization method for lowering the risk of fire in an enclosed area by using an extinguishing effect which is based on the principle of oxygen displacement. This extinguishing effect is described in paragraph [0002] of US 2003/0226669 A1. Hence, for lowering the risk of fire, an extinguishing gas (for example, nitrogen) is supplied to the target area, thereby lowering the oxygen concentration to, for example, 12 per cent by volume. At this reduced oxygen concentration, the flammability of most materials has already been sufficiently reduced so that they can no longer start to burn.

In practice, the extinguishing gases (for example, nitrogen) are usually stored in a compressed manner in steel cylinders in a specific room. When needed, the gas is then conducted into the area in question by means of piping systems and corresponding exit nozzles.

Such an inertization method, however, encounters certain problems and has clear limits in view of the size of the area to be protected. Large areas having, for instance, a basic area of 20 x 50 m and a 6.5 m height result in a volume of 6,500 m^3. In accordance with the known standards, the steel cylinders used are those having a volumetric capacity of 80 liters. The steel cylinders are filled with a pressure of 200 bar, which is presently the upper standard parameter due to the ultimate loading capacity of the available armatures. With a cylinder pressure of 200 bar, an 80 liter cylinder, for example, holds 18.3 kg of nitrogen resulting an 16 m^3 nitrogen in the

relaxed state at 1 bar ambient pressure. In order to flood the aforementioned area having a volume of 6,500 m^3 with extinguishing gas (for example, nitrogen), the contents of about 300 steel cylinders would be required. In a filled state, such a cylinder has a weight of about 100 kg, which, given 300 cylinders, would result in a weight of 30 t.

In addition, there would be the weight of the various pipes and armatures, so that very high demands would have to be made on the load ability of the store rooms. Moreover, a large floor space would be required for such a number of cylinders.

Thus, it is evident that the inertization method in connection with larger spaces encounters problems in view of the storability and the carrying capacity of the store rooms. To store the cylinders in a basement is not a satisfying solution either, although the carrying capacity is not of importance. Long conduits would have to be installed from the basement to the upper floors involving additional construction labor, which frequently cannot be easily accessed later on, and moreover prolongs the flow-in time of the extinguishing gas, in an undesirable manner.

Therefore, it was an object of my invention described in US 2003/0226669 A1 to provide an inertization method enabling the storage of extinguishing gas needed to extinguish a fire in a simple, economical manner without having to resort to premises which are normally specially provided therefore. In particular, it was an object of my invention to provide an inertization method for reducing the risk of fires and for extinguishing fires in enclosed spaces, allowing an effective extension of a fire while enabling the storage of extinguishing gas needed to extinguish a fire in a simple,

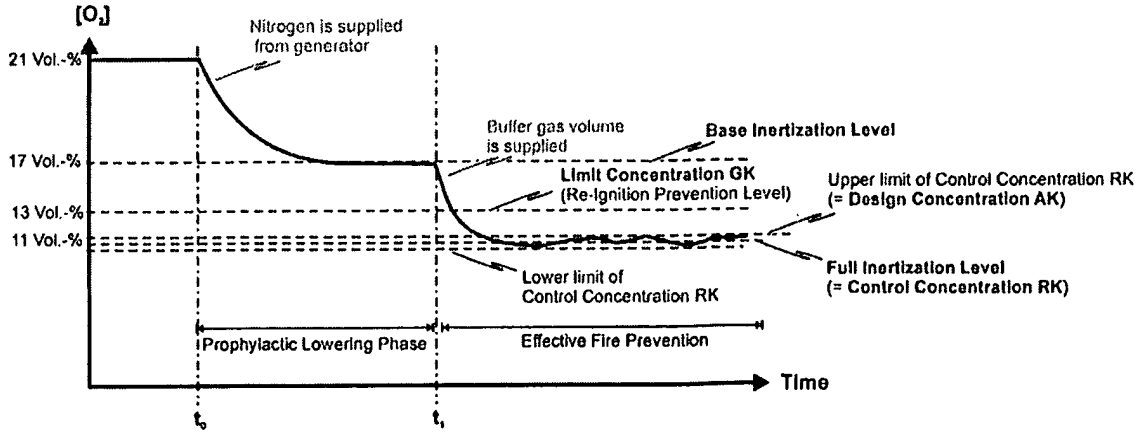
economical manner without having to resort to premises which are normally specially provided therefore.

For this purpose, I have proposed a two-stage inertization method. Briefly summarized, the oxygen content in the area to be protected is reduced to a selected base inertization level of, for example, 16 per cent. In the event of a fire, the oxygen content of the area to be protected is further reduced to a selected complete inertization level of, for example, 12 per cent by volume or less. A base inertization level of an oxygen concentration of 16 per cent by volume does not entail any risk for persons or animals, so that they can still enter the area without any problems. The complete inertization level can either be adjusted at night when no persons or animals are likely to enter the space in question, or directly in response to a detected fire. With an oxygen concentration of 12 per cent by volume, the flammability of most materials has already been sufficiently reduced so that they can no longer start to burn.

According to my invention as described in US 2003/0226669 A1, the extinguishing gas which is supplied to the area in response to a detected fire in order to adjust the complete inertization level is stored as a so-called "buffer gas volume" in an enclosed buffer space which is connected to the target area via supply lines. Hence, in case of a fire, the buffer gas volume is guided via the supply lines into the target area where, by mixing the ambient air of the target area with the buffer gas volume, the oxygen content is further reduced to the complete inertization level of, for example, 12 per cent by volume or less.

For my invention described in US 2003/0226669 A1, however, it is a precondition that the oxygen content of the buffer gas volume is so low that, by mixing the buffer gas volume with the ambient air in the target area, a full level of inertization for extinguishing purposes can be reached. In particular, it is a precondition that the oxygen content of the buffer gas volume is lower than the oxygen content of the target area. Hence, the required oxygen content of the buffer gas volume depends from the volume of the buffer space, the volume of the target area, the oxygen concentration in the target area, i.e., the oxygen concentration of the basic level of inertization (for example, 17 per cent by volume), and the oxygen content of the full level or inertization (for example, 12 per cent by volume).

A course of the oxygen content in the area to be protected, with the inertization method according to US 2003/0226669 A1 being implemented is depicted in the following drawing. The Y-axis represents the oxygen content in the protected area and the X-axis represents time.



As shown, initially an oxygen concentration of 21 per cent by volume is present in the area to be protected. Following an initial prophylactic lowering phase by a fire prevention system starting at the time t_0, the oxygen content in the area to be protected is reduced to a concentration of, for example, 17 per cent by volume. This concentration corresponds to the "base inertization level".

The oxygen content corresponding to the base inertization level is higher than the limit concentration GK which corresponds to the re-ignition prevention level and which depends from the flammability of the goods stored in the area to be protected. The limit concentration GK is, for example, 13 per cent by volume.

In case of a fire at the time t_1, the buffer gas volume, which is stored in a separate buffer space and which has an oxygen content of, for example, 10 per cent by volume, is supplied to the area to be protected and mixed with the ambient air in the target area. By mixing the buffer gas volume having an oxygen content of 10 per cent by volume with the ambient air of the area which has an oxygen content of 17 per cent by volume, the oxygen content in the area to be protected is further reduced to the so-called "full inertization level".

For extinguishing purposes, the oxygen content corresponding to the full level of inertization is lower than the oxygen content corresponding to the limit concentration GK of the area to be protected; otherwise an extinguishing of a fire in the area would not be possible. In particular, according to my invention, the full level of inertization shall correspond to an oxygen content of 11 per cent by volume.

According to my invention as disclosed in US 2003/0226669 A1, it is necessary that the oxygen concentration in the area after having mixed the buffer gas volume with the ambient air of the area is lowered slightly below the re-ignition prevention level, i.e., the limit concentration GK of, for example, 13 per cent by volume. In particular, my invention as described in US 2003/0226669 A1 does not provide for lowering the oxygen content of the target area far below the re-ignition prevention level because this would be contrary to the aim of my invention as described in US 2003/0226669 A1, i.e., to provide an inert rendering method enabling the storage of extinguishing gas to extinguish a fire in a simple and economical manner.

Rather, during the fire prevention phase, the oxygen concentration is maintained at the full inertization level of, for example, 11 per cent by volume by temporarily supplying additional extinguishing gas provided by an inert gas generator denoted in my invention as described in US 2003/0226669 A1 with reference numeral "80".

Hence, according to my invention as described in US 2003/0226669 A1, during the fire prevention phase the oxygen concentration is maintained at a control concentration RK, wherein the upper threshold thereof corresponds to the design concentration AK of the area to be protected. The design concentration AK of the area is only slightly lower than the limit concentration GK (i.e., the re-ignition prevention level) because my invention as described in US 2003/0226669 A1 does not take into account any procedure in case of a malfunction of the inert gas generator (80) which supplies the additional extinguishing gas necessary for maintaining the oxygen concentration at the full inertization level.

CONCLUSION

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 22nd April 2010

Name: Ernst-Werner WAGNER